

FRIDAY FLYER – NOV 23, 2012

Something to share—an interesting research project or kudos for a student, teacher or mentor?
Contact Kris Whelan.

CENTER SPOTLIGHT: Vanderbilt University- <http://www.hep.vanderbilt.edu/~webstems/qnweb/>

Contact Medford Webster (med.webster@vanderbilt.edu) for information on how they organize, fund and facilitate field trips to LIGO and other science experiments.

The 2012 Vanderbilt program was led by Bill Gabella and Med Webster. The theme this year was gravity with additional short sessions on the Higgs boson, superluminal neutrinos and the use of files with their muon counters. The meeting closely followed the Higgs boson announcement. Bill was on shift when some of the CMS data was taken, so he presented the case for the Higgs. They also discussed what went wrong with the neutrino speed measurement and the prospect for fresh data.

In order to increase awareness and use of the e-Lab facility with file transfers, they included brief reviews of the procedures for writing files with the muon counters and transmitting the files to the e-Lab. During the 2011-12 academic year, detectors were in three schools.

Eight teachers met first at Vanderbilt for discussions of gravity and then traveled to LIGO (Livingston, La.) to see a prime example of current gravity research. After a bit of the history of gravity, they set up the dark matter problem by contrasting the rotation curves of galaxies with that of our solar system. The group was able to relate the rotation curve for our galaxy to Doppler measurements they made when we visited the Green Bank Radio Observatory several years ago, thus showing connections between experiments. Vanderbilt teachers were prepared for the LIGO trip by observing fringes with a classical Michelson Interferometer and by having discussions of the form and incredibly tiny amplitude expected for gravitational waves. The Hulse-Taylor pulsar measurements provide indirect evidence for gravitational waves and provide teachers with an opportunity to show how science develops by comparing the status of gravitational waves today with the status of neutrinos between Pauli's conjecture and the Reines and Cowan detection. Since black holes are involved with many of the probable sources of gravitational waves, astronomer Kelly Holley-Bockelmann talked about her work. They were fortunate to have scheduled the LIGO visit during a maintenance interval so were able to see the work being done on the delicate, cascaded vibration suppressor mounts. The view of the 4 kilometer arms receding into the distance from the LIGO bridge was a stark contrast to the small, delicate work on the optics. The Vanderbilt center had good discussions with LIGO scientific staff which illuminated the goals and the mechanisms of the experiment. A significant side benefit of the tour was the opportunity to play with the impressive collection of physics demonstration apparatus which has been assembled by the LIGO outreach staff.

Resource of the week - Cosmic Ray Detector e-Lab Posters -

<https://www.i2u2.org/elab/cosmic/posters/view.jsp?submit=true&key=all&value=>

Not sure how to guide your students to generate research questions for the Cosmic e-Lab? Take a look at the posters generated by other students and teachers about their work. Students can search by topic, state and other options to find a poster related to what interests them. Try to rerun experiments already documented. Do you agree with the author's results? Similar to the peer review used by scientists, the posters provide a way to see what studies are being done and what has been "discovered" about the data.

Physics Experiment Roundup - LHCb at the LHC

<http://arstechnica.com/science/2012/11/new-large-hadron-collider-data-may-thin-out-theories-in-particle-physics/>

“Although the Large Hadron Collider is often viewed as a Higgs discovery machine—a task for which it turned out to be [admirably suited](#)—the collider isn't a one-trick pony. Last week attention fell on LHCb, the [Large Hadron Collider beauty](#) experiment.”- from ars technical, Nov 14, 2012

Just for Fun - Grid Cafe <http://www.gridcafe.org/index.html>

Learn about grid computing using this interactive website originally developed at CERN

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